

WHAT IS CLAIMED IS:

1. An isolated polypeptide comprising a sequence of amino acid residues that is at least 80% identical in amino acid sequence to residues 31-346 of SEQ ID NO:2, wherein said sequence comprises cysteine residues corresponding to residues 58, 65, 132, 147, 153 and 219 of SEQ ID NO:2.

2. An isolated polypeptide according to claim 1, wherein said polypeptide is at least 90% identical in amino acid sequence to residues 29-346 of SEQ ID NO:2, wherein said sequence comprises cysteine residues corresponding to residues 58, 65, 132, 147, 153 and 219 of SEQ ID NO:2.

3. An isolated polypeptide according to claim 2, wherein said polypeptide comprises residues 1-346 of SEQ ID NO:2.

4. An isolated polypeptide according to claim 1, covalently linked amino terminally or carboxy terminally to a moiety selected from the group consisting of: affinity tags, toxins, radionucleotides, enzymes and fluorophores.

5. An isolated polypeptide having a sequence of amino acid residues selected from the group consisting of:

a) a sequence of amino acid residues from amino acid residue 1 to amino acid residue 37 of SEQ ID NO: 2;

b) a sequence of amino acid residues from amino acid residue 29 to amino acid residue 37 of SEQ ID NO: 2;

c) a sequence of amino acid residues from amino acid residue 31 to amino acid residue 37 of SEQ ID NO: 2;

d) a sequence of amino acid residues from amino acid residue 29 to amino acid residue 45 of SEQ ID NO: 2;

e) a sequence of amino acid residues from amino acid residue 31 to amino acid residue 45 of SEQ ID NO: 2;

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f) a sequence of amino acid residues from amino acid residue 40 to amino acid residue 45 of SEQ ID NO: 2;

g) a sequence of amino acid residues from amino acid residue 40 to amino acid residue 346 of SEQ ID NO: 2;

h) a sequence of amino acid residues from amino acid residue 48 to amino acid residue 346 of SEQ ID NO: 2;

i) a sequence of amino acid residues from amino acid residues 29 to amino acid residue 276 of SEQ ID NO:2;

j) a sequence of amino acid residues from amino acid residues 31 to amino acid residue 276 of SEQ ID NO:2;

k) a sequence of amino acid residues from amino acid residues 40 to amino acid residue 276 of SEQ ID NO:2;

l) a sequence of amino acid residues from amino acid residues 48 to amino acid residue 276 of SEQ ID NO:2;

m) a sequence of amino acid residues from amino acid residue 278 to amino acid residue 346 of SEQ ID NO: 2; and

n) a sequence of amino acid residues that is at least 80% identical in amino acid sequence to a), b), c), d), e), f), g), h), i), j), k), l) or m).

6. A fusion protein consisting essentially of a first portion and a second portion joined by a peptide bond, said first portion comprising a polypeptide that is at least 80% identical in amino acid sequence to the amino acid sequence of a polypeptide selected from the group consisting of:

a) a sequence of amino acid residues from amino acid residue 1 to amino acid residue 37 of SEQ ID NO: 2;

b) a sequence of amino acid residues from amino acid residue 29 to amino acid residue 37 of SEQ ID NO: 2;

c) a sequence of amino acid residues from amino acid residue 31 to amino acid residue 37 of SEQ ID NO: 2;

d) a sequence of amino acid residues from amino acid residue 29 to amino acid residue 45 of SEQ ID NO: 2;

e) a sequence of amino acid residues from amino acid residue 31 to amino acid residue 45 of SEQ ID NO: 2;

f) a sequence of amino acid residues from amino acid residue 40 to amino acid residue 45 of SEQ ID NO: 2;

g) a sequence of amino acid residues from amino acid residue 40 to amino acid residue 346 of SEQ ID NO: 2;

h) a sequence of amino acid residues from amino acid residue 48 to amino acid residue 346 of SEQ ID NO: 2;

i) a sequence of amino acid residues from amino acid residues 29 to amino acid residue 276 of SEQ ID NO:2;

j) a sequence of amino acid residues from amino acid residues 31 to amino acid residue 276 of SEQ ID NO:2;

k) a sequence of amino acid residues from amino acid residues 40 to amino acid residue 276 of SEQ ID NO:2;

l) a sequence of amino acid residues from amino acid residues 48 to amino acid residue 276 of SEQ ID NO:2;

m) a sequence of amino acid residues from amino acid residue 278 to amino acid residue 346 of SEQ ID NO: 2;

o) a sequence of amino acid residues from amino acid residue 1 to amino acid residue 346 of SEQ ID NO: 2;

p) a sequence of amino acid residues from amino acid residue 29 to amino acid residue 346 of SEQ ID NO: 2; and

q) a sequence of amino acid residues from amino acid residue 31 to amino acid residue 346 of SEQ ID NO: 2; and

said second portion comprising another polypeptide.

7. A fusion protein comprising a secretory signal sequence having the amino acid sequence of amino acid residues 1-28 or 1-30 of SEQ ID NO:2, wherein said secretory signal sequence is operably linked to an additional polypeptide.

8. An isolated protein comprising a first polypeptide that is at least 80% identical in amino acid sequence to the amino acid sequence of a polypeptide selected from the group consisting of:

a) amino acid residues 1-29 of SEQ ID NO:2, said polypeptide comprising a cysteine residue at a position corresponding to residue 15 of SEQ ID NO:2;

c) amino acid residues 48-276 of SEQ ID NO:2, said polypeptide comprising cysteine residues at positions corresponding to residues 58, 65, 132, 147, 153 and 219 of SEQ ID NO:2; and

complexed to a second polypeptide.

10. An isolated protein according to claim 9,
wherein said protein is a homodimer.

12. An expression vector comprising the following operably linked elements:

a transcription promoter;

a DNA segment encoding a polypeptide comprising a sequence of amino acid residues that is at least 80% identical in amino acid sequence to residues 31-346 of SEQ ID NO:2, wherein said sequence comprises cysteine residues corresponding to residues 58, 65, 132, 147, 153 and 219 of SEQ ID NO:2; and

a transcription terminator.

13. An expression vector according to claim 12,
wherein said DNA segment encodes a polypeptide that is at

least 90% identical in amino acid sequence to residues 29-346 of SEQ ID NO:2 wherein said sequence comprises cysteine residues corresponding to residues 58, 65, 132, 147, 153 and 219 of SEQ ID NO:2.

14. An expression vector according to claim 13, wherein said DNA segment encodes a polypeptide comprising residues 1-346 of SEQ ID NO:2.

15. An expression vector according to claim 12, wherein said DNA segment encodes a polypeptide covalently linked amino terminally or carboxy terminally to an affinity tag.

16. An expression vector according to claim 12 wherein said DNA segment further encodes a secretory signal sequence operably linked to said polypeptide.

17. An expression vector according the claim 16, wherein said secretory signal sequence comprises residues 1-28 or 1-30 of SEQ ID NO:2.

18. A cultured cell into which has been introduced an expression vector comprising the following operably linked elements:

a transcription promoter;

a DNA segment encoding a polypeptide comprising a sequence of amino acid residues that is at least 80% identical in amino acid sequence to residues 31-346 of SEQ ID NO:2, wherein said sequence comprises cysteine residues corresponding to residues 58, 65, 132, 147, 153 and 219 of SEQ ID NO:2; and

a transcription terminator, wherein said cell expresses said polypeptide encoded by said DNA segment.

19. A method of producing a polypeptide comprising:
culturing a cell into which has been introduced an
expression vector comprising the following operably linked
elements:

a transcription promoter;

a DNA segment encoding a polypeptide comprising a
sequence of amino acid residues that is at least 80% identical
in amino acid sequence to residues 31-346 of SEQ ID NO:2,
wherein said sequence comprises cysteine residues
corresponding to residues 58, 65, 132, 147, 153 and 219 of SEQ
ID NO:2; and

a transcription terminator;

whereby said cell expresses said polypeptide encoded
by said DNA segment; and

recovering said expressed polypeptide.

20. A pharmaceutical composition comprising a
polypeptide, said polypeptide comprising a sequence of amino
acid residues that is at least 80% identical in amino acid
sequence to residues 31-346 of SEQ ID NO:2, wherein said
sequence comprises cysteine residues corresponding to residues
58, 65, 132, 147, 153 and 219 of SEQ ID NO:2;

in combination with a pharmaceutically acceptable
vehicle.

21. An antibody that specifically binds to an
epitope of a polypeptide comprising a sequence of amino acid
residues that is at least 80% identical in amino acid sequence
to residues 31-346 of SEQ ID NO:2, wherein said sequence
comprises cysteine residues corresponding to residues 58, 65,
132, 147, 153 and 219 of SEQ ID NO:2.

22. A binding protein that specifically binds to
an epitope of a polypeptide comprising a sequence of amino
acid residues that is at least 80% identical in amino acid
sequence to residues 31-346 of SEQ ID NO:2, wherein said

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sequence comprises cysteine residues corresponding to residues 58, 65, 132, 147, 153 and 219 of SEQ ID NO:2.

23. An isolated polynucleotide encoding a polypeptide comprising a sequence of amino acid residues that is at least 80% identical in amino acid sequence to residues 31-346 of SEQ ID NO:2, wherein said sequence comprises cysteine residues corresponding to residues 58, 65, 132, 147, 153 and 219 of SEQ ID NO:2.

24. An isolated polynucleotide according to claim 23, wherein said polypeptide is at least 90% identical in amino acid sequence to residues 29-346 of SEQ ID NO:2 wherein said sequence comprises cysteine residues corresponding to residues 58, 65, 132, 147, 153 and 219 of SEQ ID NO:2.

25. An isolated polynucleotide according to claim 24, wherein said polypeptide comprises residues 1-346 of SEQ ID NO:2.

26. An isolated polynucleotide according to claim 23, wherein said polynucleotide is DNA.

27. An isolated polynucleotide selected from the group consisting of:

- a) a sequence of nucleotides from nucleotide 47 to nucleotide 157 of SEQ ID NO:1;
- b) a sequence of nucleotides from nucleotide 131 to nucleotide 157 of SEQ ID NO:1;
- c) a sequence of nucleotides from nucleotide 137 to nucleotide 157 of SEQ ID NO:1;
- d) a sequence of nucleotides from nucleotide 131 to nucleotide 181 of SEQ ID NO:1;
- e) a sequence of nucleotides from nucleotide 137 to nucleotide 181 of SEQ ID NO:1;

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f) a sequence of nucleotides from nucleotide 164 to nucleotide 1084 of SEQ ID NO:1;

g) a sequence of nucleotides from nucleotide 188 to nucleotide 1084 of SEQ ID NO:1;

h) a sequence of nucleotides from nucleotide 164 to nucleotide 181 of SEQ ID NO:1;

i) nucleotide sequences complementary to a), b), c), d), e), f), g) or h); and

j) degenerate nucleotide sequences of a), b), c), d), e), f), g), h) or i).

28. An isolated polynucleotide selected from the group consisting of:

a) a sequence of nucleotides from nucleotide 131 to nucleotide 874 of SEQ ID NO:1;

b) a sequence of nucleotides from nucleotide 137 to nucleotide 874 of SEQ ID NO:1;

c) a sequence of nucleotides from nucleotide 164 to nucleotide 874 of SEQ ID NO:1;

d) a sequence of nucleotides from nucleotide 188 to nucleotide 874 of SEQ ID NO:1;

e) a sequence of nucleotides from nucleotide 878 to nucleotide 1084 of SEQ ID NO:1;

f) nucleotide sequences complementary to a), b), c), d) or e) and

g) degenerate nucleotide sequences of a), b), c), d), e) or f).

29. An isolated polynucleotide encoding a fusion protein consisting essentially of a first portion and a second portion joined by a peptide bond, said first portion is a polypeptide that is at least 80% identical in amino acid sequence to the amino acid sequence of a polypeptide selected from the group consisting of:

a) a sequence of amino acid residues from amino acid residue 1 to amino acid residue 37 of SEQ ID NO: 2;

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b) a sequence of amino acid residues from amino acid residue 29 to amino acid residue 37 of SEQ ID NO: 2;

c) a sequence of amino acid residues from amino acid residue 31 to amino acid residue 37 of SEQ ID NO: 2;

d) a sequence of amino acid residues from amino acid residue 29 to amino acid residue 45 of SEQ ID NO: 2;

e) a sequence of amino acid residues from amino acid residue 31 to amino acid residue 45 of SEQ ID NO: 2;

f) a sequence of amino acid residues from amino acid residue 40 to amino acid residue 45 of SEQ ID NO: 2;

g) a sequence of amino acid residues from amino acid residue 40 to amino acid residue 346 of SEQ ID NO: 2;

h) a sequence of amino acid residues from amino acid residue 48 to amino acid residue 346 of SEQ ID NO: 2;

i) a sequence of amino acid residues from amino acid residues 29 to amino acid residue 276 of SEQ ID NO:2;

j) a sequence of amino acid residues from amino acid residues 31 to amino acid residue 276 of SEQ ID NO:2;

k) a sequence of amino acid residues from amino acid residues 40 to amino acid residue 276 of SEQ ID NO:2;

l) a sequence of amino acid residues from amino acid residues 48 to amino acid residue 276 of SEQ ID NO:2;

m) a sequence of amino acid residues from amino acid residue 278 to amino acid residue 346 of SEQ ID NO: 2;

o) a sequence of amino acid residues from amino acid residue 1 to amino acid residue 346 of SEQ ID NO: 2;

p) a sequence of amino acid residues from amino acid residue 29 to amino acid residue 346 of SEQ ID NO: 2; and

q) a sequence of amino acid residues from amino acid residue 31 to amino acid residue 346 of SEQ ID NO: 2; and

said second portion comprising another polypeptide.

30. An isolated polynucleotide encoding a fusion protein comprising a secretory signal sequence having the amino acid sequence of amino acid residues 1-28 or 1-30 of SEQ

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